GROUNDING THE SECONDARIES OF ELECTRIC LIGHTING TRANSFORMERS TO WATER PIPES[1]

REPORT BY L. A. HAZELTINE[2] TO THE ASSOCIATION'S REPRESENTATIVES ON THE AMERICAN ELECTROLYSIS COMMITTEE

I think it would be quite proper for the committee representing the American Water Works Association to recommend a resolution to the Association removing objection to such grounding. Professor Ganz made a study of this question in connection with a report to a municipal water board, from which the following is quoted:

> From the results of my investigation I beg to say that I do not foresee any damage to the piping system nor any danger to persons that would be produced by permitting the . . . . Electric Co. to ground the secondary wiring from transformers to the water piping system in the City of . . . . provided that the ground connection is made either on the outside of buildings or else on the service pipe in the building on the street side of any pipe connections, stop cocks, meters, etc. I am certain that destructive electrolysis of the water piping cannot be produced by such ground connections. I am also certain that this grounding to the water piping does not endanger lives of people, but on the contrary prevents a high and dangerous voltage from being maintained between ground and any part of the secondary circuit wiring, and in this way affords actual protection against danger to life. Grounding transformers' secondaries to water pipes has been practiced in a great many cities for a number of years, and I do not know of a single case where any damage to the piping has resulted from this practice.

In approving the practice of grounding transformer secondaries to water pipes, the Association should require that the rules of the National Electrical Code should be followed. In my opinion the Association should also require that in cases where several buildings are supplied from the same transformer (or group of transformers) but one ground connection to the water pipe should be made, to avoid an interchange of stray direct current between buildings.

[1] Presented at the Montreal Convention by E. E. Minor, for the Association's representatives on the American Electrolysis Committee.

[2] Specialist acting with the Association's representatives on the American Electrolysis Committee; 511 Fifth Avenue, New York.

STATEMENT BY THE UNITED STATES BUREAU OF STANDARDS

The attention of this Bureau has been directed to the following resolution which has been recommended for adoption by the American Water Works Association at its Annual Convention, June 21–25, in Montreal:

WHEREAS, The grounding of the secondaries of lighting transformers to water pipes promotes safeguarding of life and does not constitute a hazard to the piping system, be it

Resolved, That the American Water Works Association approves the practice of the grounding of the secondaries of lighting transformers to the water pipes, providing that the grounding is done in accordance with the rules of the "National Electrical Code" and the "National Safety Code."

We may say without reservation that the adoption of this resolution will constitute a very great and desirable step in the progress that is being made towards the universal application of safety measures with respect to electrical circuits. It is a step, moreover, that may be freely taken without fear of appreciably complicating the relationships already existing between the public utilities concerned, and that will be of vast benefit to the public.

In the past, fears have been expressed in some quarters that the use of water pipes for the purpose of grounding secondary circuits would result in more or less trouble for the pipe-owning companies, chiefly from an increased danger of electrolysis, and also from danger to employees. With regard to the first it has not come within our observation and experience, extending over a period of years, that there is any substantial foundation for it, except where the work is done in direct violation of the rules of the National Safety Code. Where done properly, on the other hand, any current flow in the pipes would originate in the secondary circuits themselves and would not only be relatively small in value, but would also be alternating and hence of negligible effect as far as electrolysis is concerned, even if present in large quantities. This has been demonstrated many times for the commercial frequencies used in the distribution of power.

The only real possibility of increased danger from electrolysis lies in the fact that through inadvertence or otherwise, a secondary circuit may be ground in multiple to two separate pipe systems, or to different parts of the same system, between which an appreciable difference of potential exists due to stray currents from electric

railways. This may result in increased flow of railway current over the pipes, or from one pipe system to another, but is a condition that is easily taken care of by the rules of the National Safety Code which restrict multiple grounds on any secondary circuit, not only to a single pipe system, but also to parts of the same system between which there are no appreciable differences of potential. Where these rules are complied with there is, therefore, no possibility of increased danger from electrolysis.

As to danger to employees, it should be recognized that it may arise, but the chances of it arising under any circumstances are remote, and are especially so where multiple grounds are used. With multiple grounds, that is, where a secondary circuit is connected to the pipes at a number of places, at one or even more of those places work might be done on the pipes in safety with no more regard to the electrical circuit than if it did not exist. It may also be said that it is the common practice to use multiple grounds, only a small percentage of secondary circuits having single ground connections, especially where grounded to water pipes. Where there are single ground connections, however, it is advisable to guard against the remote chance of danger that may exist by requiring the electric company to disconnect ground wires from service pipes when work is to be done on them and reconnect when the work is finished. This is a reasonable and sufficient requirement and has been in force in several places for years with satisfaction to both parties.

In conclusion, this Bureau wishes to emphasize and urge the importance of the adoption of the foregoing resolution by the American Water Works Association, in that it will help to clear up a situation that has existed for many years and retarded in considerable degree the application of safety measures, namely, the reluctance of water and electric companies to establish more points of contact than were absolutely necessary. As far as strictly inter-company interests are concerned, this may be the wisest course, but in the present instance the interest of the public seems to overshadow all others and call for favorable consideration of the resolution, which we are confident will eventually prove to be the best for all of the parties concerned.